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# United States Department of Agriculture,

BUREAU OF BIOLOGICAL SURVEY—Circular No. 78.

H. W. HENSHAW, Chief of Bureau.

## SEED-EATING MAMMALS IN RELATION TO REFORESTATION.

By NED DEARBORN, *Expert Biologist.*

The demand for lumber in the United States constantly increases, while the forested area, under the ax of the lumberman, the encroachments of agriculture, and the devastation by fire, steadily diminishes. Hence the importance of reforesting such parts of the National domain as have been denuded of their forest growth.

### SEED EATERS.

One of the most serious problems connected with the reforestation of treeless areas within the National Forests is the protection of newly planted seeds from the attacks of mice, chipmunks, ground squirrels, and other rodents (fig. 1), whose depredations collectively continue the year through. The extent of this damage may be understood by the results of a reforesting experiment in the Black Hills by the Forest Service, in which from 30 to 70 per cent of the seed was destroyed by chipmunks and mice within six days after planting. In order to get an idea of the abundance of these rodents, exhaustive trapping on a half acre containing 2,000 seed spots was undertaken. We secured 3 chipmunks and 11 white-footed mice, which in three days had pilfered 70 per cent of the seed. One of the chipmunks was seen to visit 38 seed spots in four minutes. It will be readily perceived that the destruction of seed on such a scale threatens the practicability of reforestation.

Accordingly, the cooperation of the Biological Survey was requested by the Forest Service for the purpose of devising methods of protecting seeds from destructive rodents. The results of the investigations to date, so far as they relate to seed protection, appear in the present circular. As they were obtained in the Rocky Mountain region, it should be understood that the methods here recommended

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may not prove as effective elsewhere with other species of rodents. The investigations will be continued in other parts of the country and the results published later.

#### PROTECTIVE COATINGS.

Although frequently employed as a protection against rodents, coating seeds with distasteful substances, such as red lead, copper sulphate, and coal tar, has proved ineffective. The animals apparently always hull such seeds, thus removing the disagreeable coating before eating the kernel.

#### PREPARATION OF POISONED BAIT.

When a tract is to be seeded, the most satisfactory way to avoid loss of seed is to exterminate the pests prior to planting. When this is to be done on a large scale, a bait prepared as follows is recommended:

Wheat	1 bushel.
Water	1 quart.
Starch	2 tablespoonfuls.
Saccharine	2 teaspoonfuls.
Strychnia (pulverized)	2 ounces.

Add the starch, saccharine, and strychnia to the water, heat to boiling, and stir constantly after the starch begins to thicken. When the starch is fully cooked, stir it into the wheat, every kernel of which should be coated. A galvanized-iron washtub is an excellent mixing vessel, especially as it is easily cleaned. Either the sulphate or the alkaloid of strychnia may be used.

During rainy weather it is better to substitute melted tallow for the starch solution as a coating medium. In this case, the wheat should first be slightly warmed and the saccharine and strychnine added; and then the tallow applied, in the ratio of a quart to a bushel of wheat.

A much more attractive bait, and one much easier to prepare, is oatmeal, or rolled oats, the sole objection being its cost, which considerably exceeds that of wheat. Excellent results have been obtained with poison prepared as follows:

Rolled oats	25 quarts.
Strychnia (pulverized)	1 ounce.
Saccharine	1 teaspoonful.
Water	6 quarts.

The strychnia and saccharine are first added to the water, which is then mixed with the oats to produce a thick dough. This dough may be distributed by the aid of a spoon or small wooden paddle, a piece the size of a small marble being put in each place.



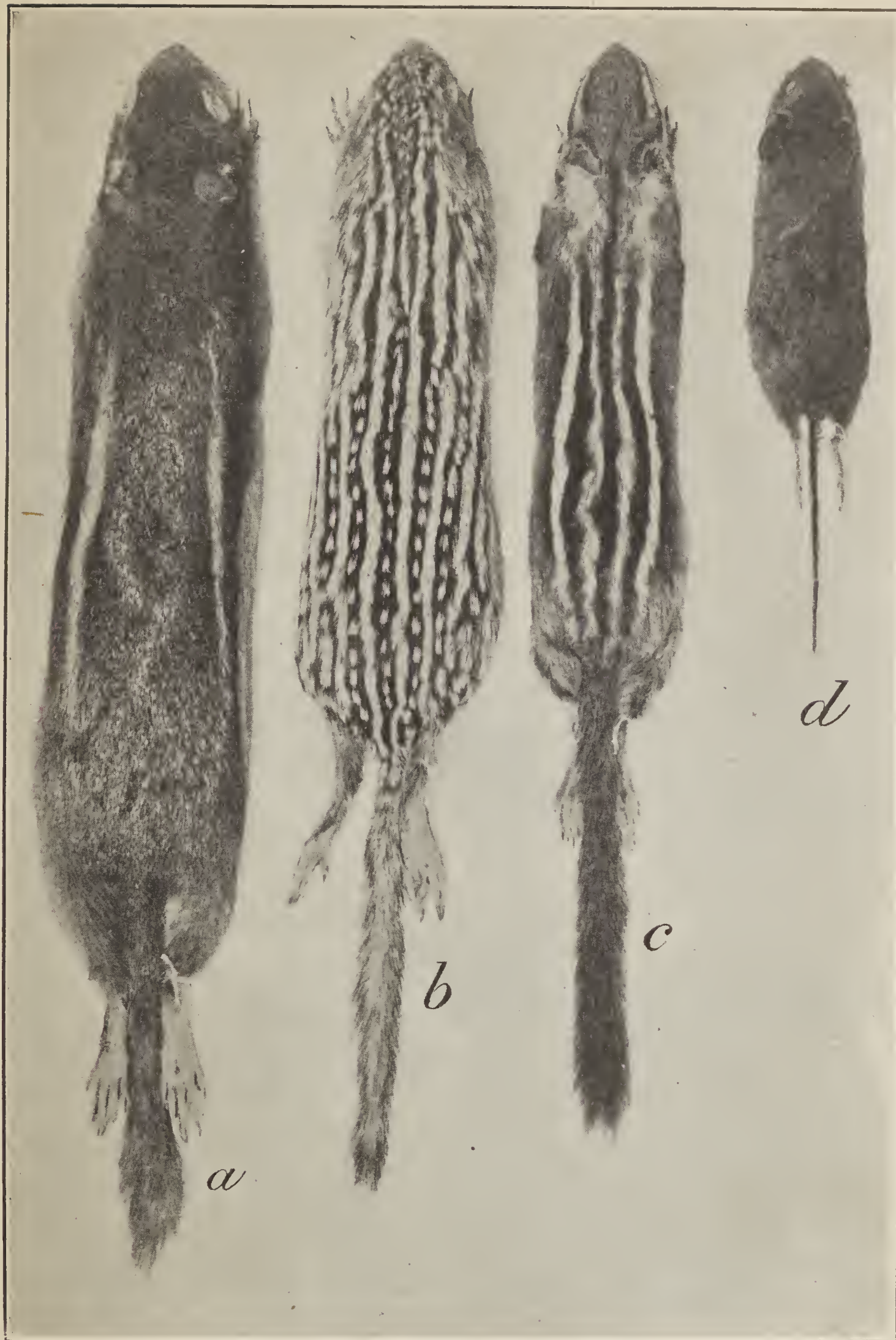


FIG. 1.—The chief seed-eaters: (a) Say ground squirrel (*Callospermophilus lateralis*); (b) thirteen-lined ground squirrel (*Citellus tridecemlineatus pallidus*); (c) Rocky Mountain chipmunk (*Eutamias quadrivittatus*); (d) White-footed mouse (*Peromyscus maniculatus rufinus*).

## HOW AND WHEN TO PUT OUT POISON.

Ordinarily in distributing poisoned wheat, about 20 kernels should be dropped every 3 or 4 feet along parallel lines 5 yards apart, an extra quantity being left under logs and shelving boulders. At this rate a bushel of wheat is sufficient for about 40 acres. In certain dry regions, however, where vegetation and the mammals subsisting upon it are mainly concentrated on favorable slopes and along streams, waste of bait may be avoided by putting it out in larger or smaller quantities according to the varying numbers of the pests. Where they are scarce, it need be put only under logs and stones and in similar retreats. The particular kinds of rodents likely to do

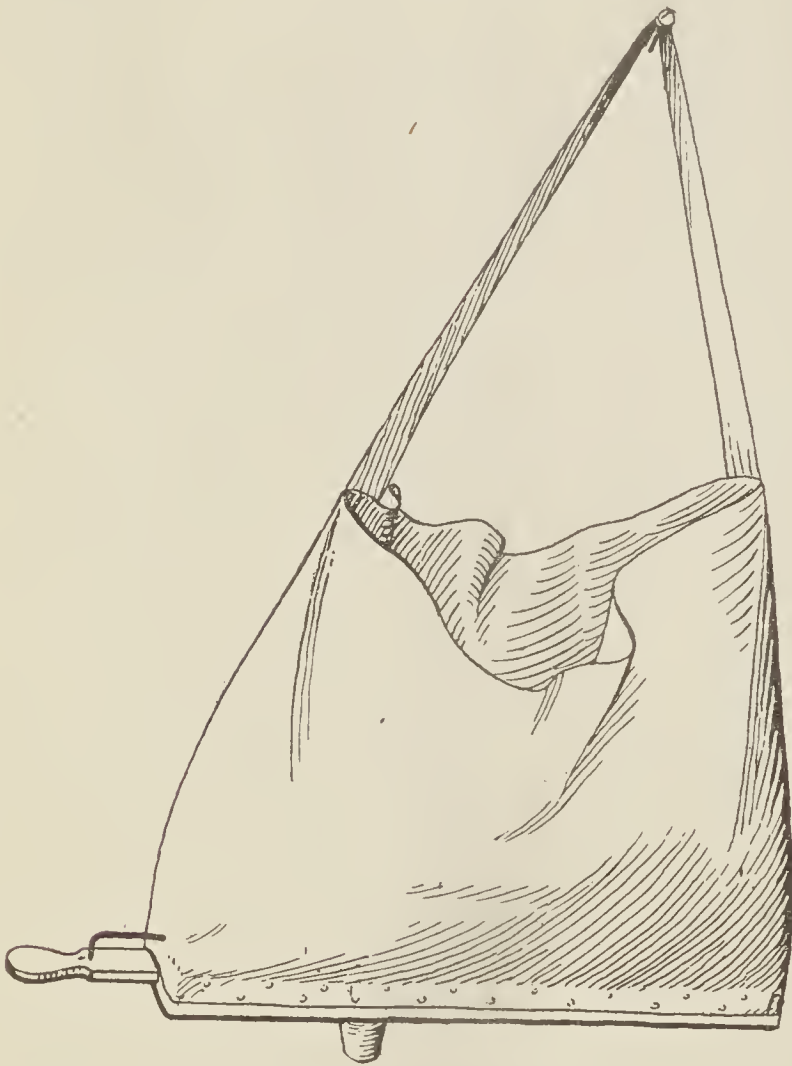


FIG. 2.—Sack for distributing poisoned grain.

mischief and the way they are distributed in any given locality may be determined by careful observations and a little preliminary trapping.

Poisoned bait may be protected from rain and guarded from birds or poultry by placing it under pieces of bark or little piles of stones. Such shelters are favorite haunts of small rodents.

Mice and chipmunks are more easily poisoned in spring, when food is scarce, than when seeds and fruits are ripe and insects plentiful. It is advisable, therefore, to distribute poison early in

the season regardless of the time of planting seed. When seeding is to be done in summer or autumn, the rodents should be destroyed over a somewhat larger area than is designed to be seeded, in order to prevent invasion from surrounding territory.

While poisoned grain may be distributed with fair speed by hand, it can be done more expeditiously by using the sack illustrated in figures 2 and 3. This sack, which is made of denim or other strong cloth, has a shoulder strap and a narrow wooden bottom fitted with a simple dropping device, the details of which are made clear by



figure 3. By alternately pushing and pulling the sliding measure, the operator can drop the grain without halting. Tallow-coated grain is likely to clog, especially when the weather is warm, but

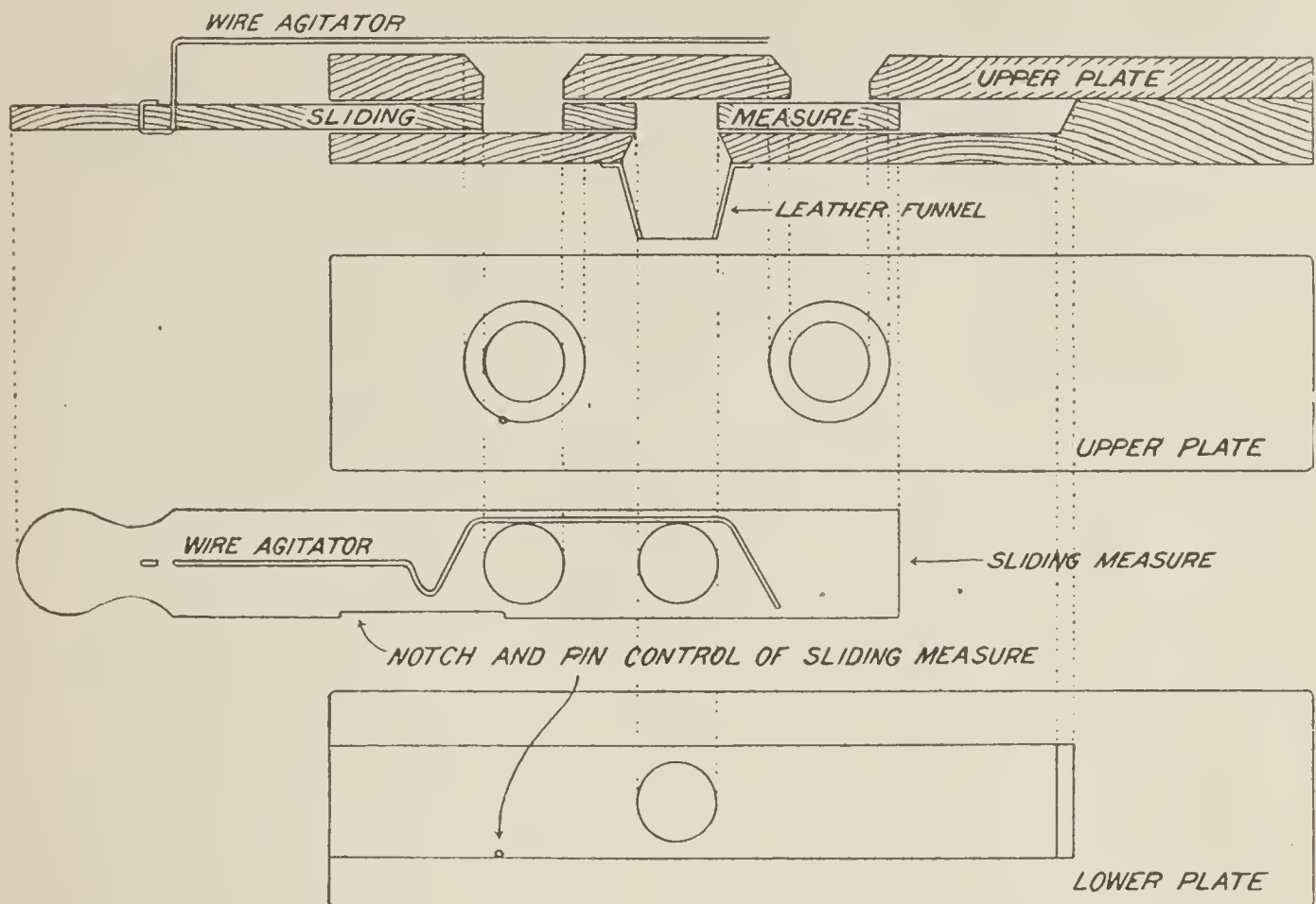


FIG. 3.—Details of the dropping device which forms the bottom of the distributing sack.

this may be prevented by crowding it down with one hand while working the sliding measure with the other. With starch-coated grain clogging rarely occurs.





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